STATE OF MINNESOTA
OFFICE OF HEARING EXAMINERS
FOR THE DEPARTMENT OF NATURAL RESOURCES

In the Matter of the Application of the Board of County Commissioners of the County of Washington to determine the natural ordinary high water level of Big Marine Lake, Big Carnelian Lain, and Little Carnelian Lake in the County of Washington, State of Minnesota, and for authority to establish management levels and construct water control structures on the aforementioned lakes.	)	INTERIM REPORT AND ORDER

The above-entitled matter came on for hearing before Allan W, Klein, duly appointed as Hearing Examiner in this matter, on May 3. 1977, at 6:30 p.m. in the Auditorium, Stillwater Senior High School, Stillwater, Minnesota. Testimony was subsequently heard on May 4, 10, 11, 12, 17, 18, 24, and June 21, 1977, at Hooley Hall, Washington County Fairgrounds, Lake Elmo, Minnesota. The record remained open for the filing of briefs until July 29,. 19 7 7

There were seven original parties, and two intervening parties. There were approximately 50 witnesses. The parties were designated in a Prehearing Order, dated April 25, 1977, to be:

Washington County;
Department of Natural Resources;
May Township;
New Scandia Township;
Concerned Big Maring Lakeshore Owners Association;
Save Carnelian Lakes Association; and
Big Marine Save the Lake Association.

Tinely petitions for intervention were filed by Kelley Land and Cattle Company, and Alden M. Booren. There was no objection to These petitions, and both petitions were granted by the Hearing Examiner. Both were allowed to intervene as parties, pursuant to Minn. Rule HE 210 (c) (3) .

SCOPE OF THIS INTERIM REPORT

one of the issues for determination at the hearing was the natural ordinary high water levels (hereinafter "NOHW") of Big Marine Lake, Big Carnelian Lake, and Little Carnelian Lake.

virtually the only testimony regarding these levels came from Department of Natural Resources personnel. DNR had conducted a survey of Big Marine Lake in the spring of 1976, and prepared a report (DNR Exhibit D) setting forth findings and conclusions. In that report, it was concluded that the NOHW for Big Marine Lake was 942.5 feet (above mean sea level datum). A similar report was also prepared concerning Big Carnelian Lake and Little Carnelian Lake (DNR Exhibit E), which concluded that there was little recoverable evidence found to determine a single NOHW level for Big Carnelian, and that evidence was also lacking concerning the NOHW for Little Carnelian.

As is more fully set forth below, both reports appear to be based on a misunderstanding of what a NOHW is, and how it is to be determined (see p.25). It is impossible, from the record as it exists, to determine the correct NOHWs. Therefore, the Order concluding this Interim Report directs DNR to recompute the NOHWs, based upon a new definition, and present their findings to a reconvened hearing to be held on October 6, 7:00 p.m. at Hooley Hall.

Since much of the final report has already been written, whole sections of that report are presented here for background. In addition, these sections are presented at this time in order to provide answers to some questions which are best answered as soon as possible. However, no findings are made with respect to the two ultimate issues (NOHWs and desireable control levels), as both depend upon the NOHW recomputations ordered below.

INTRODUCTION AND HISTORIC LAKE LEVELS

Big Marine Lake is a large (1582 planimetered acres) lake located primarily in New Scandia Township in Washington County, Minnesota. Big Carnelian Lake is smaller (384 planimetered acres), and is located in May Township, Washington County. Little Carnelian Lake is still smaller (68.2 planimetered acres), and is also located in May Township, Washington County.

Although precise lake level data is available for only the most recent years, less precise, but still reliable data was presented at the hearing covering sporatic periods back to 1847. In 1847, it appears that Big Marine Lake was somewhere in the

942-943 range (all such figures are in feet above mean sea level datum). The lake was high again in 1906 (approximately 943.5), and again in 1920 (941.0). It dropped drastically during the drought years, to a range of 930-933.5. It was relatively high in 1952 (939.4), but by 1960, it had dropped back to 935.8. From 1960 to the present, it has risen virtually every year, reaching 940.15 in 1972, 940.45 in 1973, 940.95 in 1974, and it is alleged to have gone as high as 943.0 in 1975 (Testimony of R. Jensen). Other sources place the 1975 high at 941.9 (County Exhibit F) and 942.3 (TKDA* Report, Table 6-2). In 1976, the high was variously reported as 942.8 (TKDA), 942.77 (R. Jensen) and 942.41 (County Exhibit F). In 1977, the high point was variously reported as 941.25 (K. Reed of DNR) and 940.88 (D. Kasma of TKDA). In summary, Big Marine Lake appears to have peaked at an elevation greater than 940 in 1847, 1906, 1920, and every year since 1972.

Big Carnelian Lake has even less data on its levels, and there is a dearth of early data. It was between 870 and 880 in 1847, but was at 853.5 in 1960. It remained below 860 from at least 1960 until 1975, when it went as high as 861.8 (TKDA) or at least 861.66 (County Exhibit F). In 1976, it was variously reported at 864.5 (TKDA), and 864.23 (County Exhibit F). In 1977, it was variously reported at 863.28 (D. Kasma of TKDA), and 862.96 (K. Reed of DNR).

Little Carnelian Lake has the least data of the three. While it was at 870-880 in 1847, we have no reliable data between then and 1976, when it was reported at 822.2. During 1977, it has ranged between 821.32 and 821.13.

While Little Carnelian has only a few structures on its shore, Big Carnelian and Big Marine have upwards of 200 each. It is the inundation of structures and their sewage disposal systems on these two lakes that has caused the Department and the County to study water level problems, and propose solutions.

*Toltz, King, Duvall, Anderson and Associates, Inc.

Such studies have gone on sporatically since 1958, and continuously since 1972.

PRIOR STUDIES

Much of the information presented at the hearing came from various studies which have been conducted over the years, to determine the cause of the rising lake levels, and to find a solution to the property damage problem they have presented. While it is impossible to present a complete list of these studies, it is important to be familiar with at least the following:

--Report On Present and Natural Water Levels of Big Marine Lake: Adolph F. Meyer (1958).

--Big Marine Lake: A Summary and Evaluation of Water Level Problems: Division of Waters, Soils and Minerals, DNR (1972).

--Big Marine Lake Water Level Study: Orr-Schelen-Mayeron & Associates, Inc. (1975).

--Natural Ordinary High Water Investigation for Big Marine Lake, Washington County: Division of Waters, DNR (1976).

--Washington County Water Management Study: Toltz, King, Duvall, Anderson and Associates, Inc. (1976).

--Soil Borings & Reconnaissance Drainage Investigation: Big Carnelian Lake: Braun Engineering Testing (1976).

--Hydrogeologic Investigation of Big Carnelian Lake: Fletcher G. Driscoll (1977).

--Interim Report on Big Carnelian and Little Carnelian Lakes: DNR (1976).

--Report on Historic Water Levels and Natural Stages of Carnelian Lakes: Division of Waters, DNR (1976).

WERE THE RECENT HIGH LEVELS A RESULT OF UNNATURAL BLOCKAGES?

To a person who has invested thousands of dollars in a home, and then thousands more in protecting that home from rising waters, the sight of water rising still further, overcoming his protective efforts and literally washing away both of his invest-

ments, creates not only a tremendous financial loss, but also an emotional loss which defies quantifying in dollar amounts. That person, plus many others who wonder if their home might be the next to go, demand an answer to the obvious question: After many years of relatively stable lake levels, why is this happening now?

There were many theories suggested at the hearing to explain the recent high levels of Big Marine and Big Carnelian. Some of

those theories were based upon a belief that there has been an artificial blocking of the natural drainage channel between Big Marine and Big Carnelian. other theories were based solely upon natural causes. A review of the evidence, which was offered by proponents of both theories, indicates that there has been no artificial blockage of the natural drainage channel, but rather, that recent lake levels are a result of natural causes.

The water levels affecting Big Marine Lake logically divide themselves into three separate categories:

Deep underground aquifers;
Shallow underground water table; and
Surface waters.

Big Marine Lake is located on top of a huge underground layer of water-bearing porous sands, known as the Jordan Aquifer. This Aquifer has an area of more than seven thousand square miles. Between the Aquifer and the surface of the land is a relatively impervious layer of rock known as the Oneota Dolomite. There are cracks and fissures in this layer which permit water to flow both upward and downward between the Aquifer and the surface. The extent and direction of this flow, however, varies from time to time, depending upon the levels in both the Acquifer and surface lakes. This has led to the concept of a "pressure head' and a widely accepted theory that as the depth of a lake on the surface increases, there will be additional pressure forcing water to seep down through the Dolomite into the Aquifer. However, as the water level in the Aquifer increases, there is an increase in pressure resisting any additional flows downward, and indeed, the seepage might finally reverse itself, with water being forced to seep upward into a low point on the surface such

as a lake bed.

The level of the Jordan Aquifer varies from year to year, and the relevance of this variance to Big Marine Lake calls into play a second, and different concept from that of the pressure head. This second concept is called the "piezometric" or potentiometric level of the Aquifer, and it relates to the level at which water from the Aquifer contributes to the lake level.

The piezometric level of the Jordan Aquifer varies around 925 feet at the center of Big Marine Lake. Thus, if the lake were pumped dry, water from the Jordan would maintain the lake at approximately 925 feet.

The Jordan Aquifer's piezometric level has been rising, consistently, since 1970. A well near Maplewood, Minnesota, is maintained by the U.S. Geologic Survey. That well has shown peak readings of 140, 139.5, 138.5, 137.7, 137.4, 135.3, and 134.7 feet below ground level in the years 1970-1976, respectively. These annual peaks correlate quite closely with the annual peak levels of Big Marine Lake (see Big Marine Save Exhibit 4).

Putting those two concepts (pressure head and piezometric level) together, it can be seen that as the difference between piezometric level and the lake level increases, there will be increased seepage downward from the lake to the Jordan. However, as that differential decreases, there will be less downward seepage. The differential between the two can vary because either of the two levels varies, or because both of them vary.

The ground water table is much closer to the ground than is the Jordan. Figure 4-1 of the TKDA Report shows the location of two observation wells near Big Marine Lake. Figure 4-2 compares their levels with those of the lake, showing a close correlation between the two, and demonstrates the continuous increase in ground water table levels since 1970.

Why did both the piezometric level of the Jordan, and the level of the ground water table, rise during these years? Rainfall data gives some clue.

The National Climatic Center of the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, has maintained rainfall data for Stillwater since at least 1949. During the 28 years between 1949 and 1976, the average annual precipitation for Stillwater was 28.6 inches. During the period 1968-1976, the average annual rainfall was 29.3 inches. Without including 1976, it was 30.84 inches. Significant rain fell in

1968 (35.06), 1970 (35.02), 1972 (32.14), 1973 (32.36), and 1975 (45.15). While it is difficult to draw conclusions about the effect of rain without looking at another variable (evaporation), it can be said that in the six years between 1970-1975, four of them were significantly wetter than normal. It is important to note that high levels of rainfall have a cumulative effect on the lakes' levels, particularly through the ground water table. In other words, it is not so much the single year of high rain, but rather the five or ten year wet cycle, which is important to lake levels.' The ground water table, and the wetlands to the south of Big Marine Lake, act as a giant sponge, which stores water from year to year, and feeds water into the lake even when there is little rain (such as 1974). If the sponge is already saturated by a wet series of years, it cannot absorb significant new water (such as the rain of 1975).

Big Marine has one principal inlet and outlet, which is at its south end. During normal years, water flows into the lake from a wetland area directly south of the lake. It should be noted that water also flows into the lake at other, undetermined points, as the lake is the lowest point in its watershed. This watershed is estimated to be an area of 12,160 acres. These additional inputs consist not only of visible surface points (streams), but also there is invisible ground water seepage into the lake. There was particular attention focused upon the wetlands south of the lake because they also constitute the only outlet for the lake (other than downward seepsge and upward evaporation). It is important to realize that the only effect of this wetland area on the rising lake level is one of input, and stated simplisticly, that area continues to input water into the lake until the lake reaches its runout elevation, at which time the flow north slows, then stops, and then reverses itself. The only way in which this wetland area to the south of the lake could be blamed for the rise in lake levels is that it did contribute waters to the lake as it rose in the 1960's and early 1970's. Indeed, if the channel between the wetlands area and the lake were blocked (as some contended) such a blockage would

only impede the flow of waters into the lake during this period, thus retarding the lake's rise.

The theories of intentional alteration of the drainage channel implied that the old existing channel must have been blocked, preventing waters from draining out of Big Marine Lake at the same level that they used to. These theories rest, in part, upon a statement contained in the DNR 1972 Report, which states:

> However, if Big Marine Lake was high enough to outlet (above 942.0) then restrictions (natural and unnatural) do exist and would have to be corrected to gain proper capacities to function as an adequate outlet channel for Big Marine Lake. Natural restrictions exist the entire distance from the lake to the runout location in the form of heavy aquatic growths, floating bog and sedge, silted in channels and very likely beaver activity. The unnatural restrictions exist primarily at the field crossing at the south end of Mud Lake and at C.R. 81 (1/4 line road in section 17) and immediately downstream from C.R. 81.
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> --DNR 1972 Study, p. 13.

It is helpful to orient the reader to some landmarks referred to in the preceeding quotation, and which will be used in later sections of this Report. This is perhaps best done by examining DNR Exhibit K-1, but for purposes of this Report, the following drawing, taken from DNR Exhibit K-5 is helpful:

LOCATION MAP

SCALE : I" 1 MILE

The dotted line represents DNR's belief as to the location of the drainage channel. However, others believe that it is located elsewhere. This drawing is used solely to identify landmarks, and should not be taken as the Examiner's having adopted the DNR position.

The vast majority of the land on either side of the drainage channel between County Road 4 and County Road 81 is owned by Kelley Land and Cattle Company. James E. Kelley and his wife own all of the stock of this corporation. The property also includes all of the land surrounding Mud Lake and Turtle Lake, and extends south of County Road 81.

The highest point in the drainage channel is located between Turtle Lake and County Road 81, on the Kelley property. This point was identified as the runout point for Big Marine Lake by both Adolph Meyer (1958) and Ken Reed (1972 and 1976). Meyer found the elevation of this point to be 942.2, and Reed found it to be 942.0. Regardless of which is correct, the important fact about this point is that its elevation determines the level to which Big Marine Lake must rise before any runoff will occur. That is not to say that the lake will not rise above that point, because it has done so, due to the fact that the drainage channel does not have adequate capacity to immediately drain all water above that runout elevation. The channel is not a clearly defined, steep-banked stream bed, with a sand and pebble bottom. Rather, at least at some places, it is grown over with grass and trees. In other places, it is lost in marshy bogs with floating vegetation which obscure its actual location. In addition, roads have been built on top of it, and culverts have been installed in those roads. All of these features, plus its narrow width in some places, reduce its capacity to immediately drain off all the water that might be above the runout elevation. If inflows to the lake (from direct rain, surface runoff and ground water seepage) exceed outflows from the lake (downward seepage, upward evaporation, and runoff through this channel), the lake will rise above the runout elevation.

Both Meyer and Reed state that the runout elevation does not appear to have been artifically altered. Reed claimed that the difference between 942.2 and 942.0 was so small as to be "all the same".

Ken Vinar of the U.S. Soil Conservation Service performed a series of borings near County Road 81 in an attempt to determine if the runout elevation had been altered. He found no evidence that it had been. However, he did find a "buried horizon" which followed the present drainage channel, on both sides of County Road 81. While this buried horizon was significantly lower than the existing channel in some places, there was no way for Vinar to estimate the dates during which it had served as the channel. At the earliest, it was 35 years ago, but it could well have been hundreds, or even thousands of years ago. It is specifically found by this Examiner that the inability to more precisely date the period during which this channel flowed, as well as the inability to determine its maximum elevation during such flowage period, renders Vinar's horizon useless in dealing with present day problems.

While there was a fair amount of time devoted to determining the elevations of the various culverts along the runout channel, all that was really accomplished by this, with one exception, was to confirm earlier findings about the location of the runout point found by Meyer and Reed. The exception was a culvert across the cattle crossing between Mud and Turtle Lakes.

In the summer of 1975, the isthmus separating the two lakes (which did have an 18 inch culvert under it, with invert elevations of 939.45 and 939.16) flooded over, to a depth of about 1.5 feet. In the fall of 1975, this crossing was rebuilt, and a new 18 inch culvert was installed. In the spring of 1976, there was about five inches of water above the new culvert, but the isthmus did not flood. However, it was discovered that when the new culvert had been installed the previous fall, it had been installed approximately 1.5 feet higher than the old culvert had been. At the suggestion of DNR, this mistake was rectified by

the installation of another culvert, with invert elevations of 938.60 and 938.33. This second culvert is 24 inches in diameter. In the spring of 1976, water ran through both the new 18 inch culvert and the new 24 inch culvert.

A number of different individuals have traversed the entire length of the outlet channel from Big Marine Lake to County Road 81 and based on their testimony, and all of the evidence, it is specifically found that with the sole exception of now-corrected misplaced culvert between Mud and Turtle Lakes, there is no evidence to support allegations that there have been any intentional, artificial blockages placed in the channel. of course, every road and culvert is "unnatural". But there must be a distinction drawn between that type of unnatural restriction, and the unnatural restriction that would result from intentional blocking of the channel by damming or diking.

In summary, there is no evidence to suggest that there has been any artificial alteration of the channel, except for the building of roads and the installation of culverts under those roads. This is not to say that the channel is a perfect escape valve for water above 942.0, because it is not. Its capacity is limited in numerous places by vegetation, culverts, and its own width and depth.

PROCEDURAL POSTURE AND DEFINITION OF ISSUES

On or about January 12, 1977, an Application for Permit to Work in Public Waters was filed with DNR by William A. Schwab, Washington County Planning Coordinator, on behalf of the Board of Commissioners of Washington County. This application, and its various exhibits, purports to request a permit from DNR to construct control structures and drainage channel improvements.

However, Exhibit J to that application states that the application does not include sufficient documentation regarding actual construction of the project because:

> .we feel before we can invest additional thousands of dollars in having actual construction drawings prepared along with the detailed environmental analysis, a determination by the commissioner of natural resources regarding lake levels for these two lakes

> [Big Marine and Big Carnelian] must be made. To this end, we request that the necessary public hearings be scheduled by the Department of Natural Resources as soon as possible to take testimony regarding lake elevations for these lakes.

Earlier in the same exhibit, it is stated:

> In order for us to proceed any further, it is necessary, in our opinion, to have the commissioner of natural resources make a determination regarding lake levels for these two lakes.

On March 30, 1977, C.B. Buckman, Special Assistant to the Commissioner of Natural Resources, issued an Order and a Notice of Hearing, which state that evidence will be received, at a public hearing, regarding:

1. Natural ordinary high water levels of Big Marine, Big carnelian, and Little Carnelian Lakes,
2. Desirable water levels for each lake, and
3. Whether it is in the public interest to grant authority to the County Board as applied for.

On April 6, Buckman issued a Notice of Cancellation of Hearing, indicating that the hearing would be postponed. on April 18, 1977, Michael C. O'Donnell, Acting Commissioner of Natural Resources, issued an Order and Notice of Hearing, and an Order appointing Hearing Officer.

On April 25, the Hearing Examiner issued a Prehearing Order, stating that the hearing would be a proceeding to establish a record of facts to enable him to recommend to the Commissioner:

1. The natural ordinary high water levels of the three lakes, and
2. Desirable management levels for artificial controls of the three lakes.

On the first night of the hearing, and in subsequent sessions, questions were raised concerning the extent to which Schwab had been authorized by the County Board to file the application for permit. Therefore, a brief history of what the County Board did authorize follows below.

On July 16, 1973, the County Board passed a resolution petitioning DNR to:

1. Commence all appropriate proceedings to identify and ascertain the original, natural outlet, and its elevation, of Big Marine Lake, and

2. Establish and set a maximum high water level for Big Marine Lake most beneficial to all persons affected thereby, including the public, in conformance with said original, natural outlet elevation.

On February 17, 1976, the Board passed a second resolution, petitioning DNR to hold a public hearing to establish the natural ordinary high water level (hereinafter NOHW) and to determine the natural runout elevation of Big Marine Lake, Big Carnelian Lake, and Little Carnelian Lake.

On January 14, 1977, the Board authorized Schwab to submit an application to DNR to establish a lake level control elevation for Big Marine Lake at 940 and Big Carnelian Lake between 859 and 863, in accordance with the TKDA Report.

On April 18, 1977, the Board rescinded its January 4 resolution to the extent that the resolution implied that 940 was recommended by the Board, stating that the Board had no opinion as to a particular control elevation, and that since DNR may determine that the elevation be set at the outflow elevation (which the Board considered to be 942.5), DNR should determine the control elevation, as it sees fit, between 940 and such outflow elevation as DNR may determine.

On the first night of the hearing, Schwab stated that the Board's application for permit asks DNR to determine the N0HW for the three lakes and 'also asks that the Commissioner determine and permit the County to set artificial lake levels on Big marine Lake and Big Carnelian Lake' (Tr. I-24). At the time that the application was offered into evidence, Stephen Chapman asked whether it was actually a request for a permit to perform work. William Peterson, Special Assistant Attorney General, replied that it was a request for a permit to do work. Chapman stated that this was a surprise to him, as he believed only lake

levels would be set in this proceeding, and that the outcome of this proceeding would not automatically permit the County to proceed with any actual construction. Ronald Harnack of DNR clarified this by stating:

> I think the question asked is that what specifically comes out of this hearing this evening will not, in itself, authorize construction to begin, based upon the various alternatives. It will establish a given level to which a project could be constructed, and then there will have to be much additional engineering and detail which will have to go in to identifying how it, indeed, is going to be accomplished before the Department grants an official permit for the construction to begin, if it, indeed, grants such a permit.
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> Tr. I-52-3.

After further interchange, Peterson stated:

> As I understand the thrust of the application, this would be essentially on a preliminary basis to determine what the range, what the NOHW is, what the desirable water level is and what preliminarily would be an environmentally sound approach towards the channelization and construction and excavation that will be involved in this matter. As to the details of that construction, there would be--these particular details would be postponed to a final hearing, final proceeding.
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> Tr. 1-58.

Finally, both Peterson and Schwab stated that further public hearings would be held prior to any construction (Tr. I-60).

Prior to the conclusion of the hearing, Roderick Lawson, who represented Big Marine Save the Lake Association, formally objected to that part of the application which would request that the Hearing Examiner set desirable lake levels. This was based upon his belief that the County Board had not authorized Schwab to request, from DNR, anything but NOHW levels (Tr. xI-93-9). That objection was taken under advisement, and it is

now specifically found that the resolution of January 4, 1977, as amended by the resolution of April 18, 1977, did authorize Schwab to file an application with DNR, which application would request DNR to establish lake control elevations. It is clear that from the resolutions that they were based upon the TKDA Report, and that what the resolution calls "lake control elevation" is the same thing as "desirable lake level', as the

latter phrase was used in the Prehearing Order and throughout the hearing.

In summary, this set of hearings is but the first step, as contemplated by both DNR and the County, in the process of attempting to implement the recommendations of the TKDA Report. Actual construction will not begin without additional hearings, and the sole purpose of these hearings was to determine the NOHW and desirable control elevations for the three lakes. To the extent that the County desires to proceed after receiving this Report, ecological considerations have been considered, and are included in the Recommendation, so that the County will have guidance as to how to proceed consistent with applicable law. [Note: This section was prepared as part of the final report. While its conclusions remain valid, the procedure outlined in the preceding paragraph is modified by the additional evidence to be received pursuant to the Order of this Interim Report. See "Scope of this Interim Report", above].

APPLICABLE LAW

There are two statutory schemes which regulate any implementation of the County's proposal.

The first is contained in Minn. Stat. 105.42 to 105.47 (1976). Section 105.45 states, in relevant part:

> If the Commissioner concludes that the plans of the applicant are reasonable, practical, and will adequately protect public safety and promote the public welfare, he shall grant the permit, and, if that be in issue, fix the control levels of public waters accordingly. In all other cases the commissioner shall reject the application or he may require such modification of the plan as he deems proper to protect the public interest. In all permit applications the applicant has the burden of proving that the proposed project is reasonable, practical, and will adequately protect public safety and promote

the public welfare.

The second statutory scheme that affects this application is Minn. Stat. ch. 116D (1976). Section 116D.04, subd. 6 and 7 state:

> (6) No state action significantly affecting the quality of the environment shall be allowed, nor shall any permit for natural resources management and development be granted, where such action or permit has caused or is likely

> to cause pollution, impairment or destruction of the air, water, land or other natural resources located within the state, so long as there is a feasible and prudent alternative consistent with the reasonable requirements of public health, safety, and welfare and the state's paramount concern for protection of its air, water, land and other natural resources from pollution, impairment, or destruction. Economic considerations alone shall not justify such conduct.
>
> (7) Regardless of whether a detailed written environmental impactment statement is required by the board to accompany an application for a permit for natural resources managment and development, or a recommendation, project, or program for action, officials responsible for issuance of aforementioned permits or for other activities described herein shall give due consideration to the provisions of Laws 1973, chapter 412, as set forth in section 116D.03, in the execution of their duties.

NATURAL ORDINARY HIGH WATER: DEFINITIONS

NOHW level is not defined in any statute. Its definition flows from a number of court cases.

The leading case in Minnesota defining NOHW is In re Minnetonka Lake Improvement (also entitled Carpenter v. Board of Commissioners of Hennepin County), 56 Minn. 513, 58 N.W. 295 (1894). That case involved a proposal by the County Board to establish and maintain a uniform water level on Lake Minnetonka. During the 12 years prior to the court action, the lake had varied between an extreme high of 223.65 (above an arbitrary base line) and an extreme low of 217.84. It had been as high or higher than 220.91 for 35 out of 136 months (approximately 26 percent of the months). The County Board proposed that the lake be maintained at 220.91. Land owners who were being assessed for the project objected, and the Court upheld their objection, because the proposed control elevation was above the NOHW, as the Court thought it should be defined.

The shores of the lake were steep in some places, but flat in others, and adjacent to those flat shores was land which was only slightly above the ordinary water in the lake. The Court stated that those lowlands formed no part of the bed of the lake, but were more or less subject to periodic overflow at certain seasons of the year; but they were sufficiently dry,

when the water subsided, to be useful for pasture or meadowland.

The Court described past lake levels as follows:

> The height of the water in the lake varies in different years and at different seasons of the same year according as the year or season of the year is wet or dry ... These changes in the height of the water are irregular, without fixed quantity or time, except that they occur periodically, according as the year or the season of the year is wet or dry. The rises of the water, to a sufficient height to overflow, in whole or in part, these lowlands, are not infrequent, and are liable to occur any year, usually in the spring; but the water generally subsides later in the season, so as to render the lands capable of use as meadows and pastures.

The Court stated that if the lake were maintained at 220.91, as the County has proposed, some of these lowlands would be permanently overflowed, or would be rendered so wet that they could no longer be used for pasture or meadow.

The Court then went on to state that the ordinary high water mark (which is equivalent to the NOHW) does not mean the extreme line which water might reach "in times of high water, caused by rains or melting snows, which are not unusual or extraordinary, but occur annually, or at least frequently, during the wet season." The Court went on to use the Mississippi River as an example:

> It[the Mississippi] is subject to periodical, and almost annual, rises, usually in the spring, when the water overflows its banks, and submerges thousands of acres of bottom lands which are, at other seasons of the year, dry and valuable for timber, grass, and even agriculture. The stage of water necessary to overflow these lands is not extraordinary or unusual in high water, in the popular sense, for it is liable to occur and does occur, almost every year. An yet it would be hardly claimed [that the lands lie below the NOHW] ....

The Court then goes on to say that in the case of fresh-water

rivers and lakes, which are subject to "irregular and occasional changes of height' which are periodical or recurring with the wet or dry seasons of the year:

> high-water mark...is to be determined by examining the beds and banks, and ascertaining where the presence and action of the water are so common and usual, and so long-continued in all ordinary years, as to mark upon the soil-of the bed a character distinct from that of the banks, in respect to vegetation, as well as respects the nature of the soil itself.
>
> (Emphasis added)

The Court went on to stress that the high-water mark was, indeed a mark, and that it is coordinate with the limit of the bed of the water, which is occupied by water sufficiently long and continuously to wrest it from vegetation, and destroy its value for agriculture. Where the banks are steep, this mark may be found both on the soil and on vegetation. In places where the banks are flat, however, there may be no soil mark, and vegetation must be the principal test. The Court then concluded its definition by saying:

> It is the point up to which the presence and action of the water is so continuous as to destroy the value of the land for agricultural purposes by preventing the growth of vegetation, constituting what nay be termed an ordinary agricultural crop,--for example, hay.

The Court, in the Minnetonka case, held that the proposed control level (220.91) was above the ordinary high-water mark.

A more recent case, Mitchell v. City of St. Paul, 225 Minn. 390, 31 N.W.2d 46 (1948), affirmed the Minnetonka test as being the only test which could be used to determine the NOHW. This case was brought by a shoreland owner on Lake Vadnais and Twin Lake, against the City, alleging that the City had committed a tresspass upon his land by allowing Lake Vadnais to rise above the NOHW. The recorded extreme high water mark between 1885 and 1942 was 189.59, which occurred in 1906. In 1942, Lake Vadnais reached a new high of 190.49. The landowner did not attempt to establish the NOHW by use of the Minnetonka test, but rather argued that since the mean extreme high water mark for the years 1901-1942 was 186.95, the NOHW could not be higher than 186.95, and thus he was entitled to damages when the City (as he alleged) allowed the water to rise above 186.95. The Court disagreed

with his claim, stating that he failed to prove what the NOHW was, because he did not use the Minnetonka test. The Court said that the NOHW might well be above, be at, or be below the mean extreme elevations for the past 41 years, and the only way to determine the NOHW was to use the Minnetonka test.

The Minnetonka case, and the definition contained therein, is based upon an early United States Supreme Court case,

Howard v. Ingersoll, 54 U.S. 380, 13 How. 381, 14 L.Ed. 189 (1851). That case was concerned with distinguishing between the bed of a river, and its bank. In that case, the Court stated that the vegetation test for a navigable stream's ordinary high-water mark does not result in a line which would mark the place where all vegetation has been destroyed by the water covering the soil, but rather that the line should mark the point below which the soil has been covered by water for sufficient periods of time to destroy its value for agricultural purposes. In defining the outer line of the bed of a river, the Court said:

> It neither takes in overflow land beyond the bank, nor includes swamps or low grounds liable to be overflowed, but reclaimable for meadows or agriculture, or which, being too low for reclamation, though not always covered with water, may be used for cattle to range upon, as natural or unenclosed pasture. But it may include spots lower than the bluff or bank, whether there is or is not a growth upon them, not forming a part of that land which, whether low or high, we know to be upland or fast lowland, if such spots are within the bed of the river.

The Howard case was cited by the Minnetonka Court, and later cases have found that the principle of Howard was followed by Minnetonka. Although there have not been any significant clarifications of Minnetonka, there have been clarifications of Howard, and one of those cases is of benefit to the Big Marine Lake situation.

In Borough of Ford City v. United States, 345 F.2d 645 cert. denied, 382 U.S. 902, 86 S.Ct. 236, 15 L.Ed.2d 156 (1965), a Court of Appeals was faced with what it believed to be an improper interpretation of the Howard test. The Ford City case arose after the Department of the Army constructed a lock

and dam on the Allegheny River below Ford City, Pennsylvania. Ford City had a gravity flow sewer system which flowed into the Allegheny. After the Army constructed its dam, the river rose, causing serious damage to the City's sewer system and necessitating constant pumping operations. The City sued the Department of the Army for money damages. The issue in the case was whether

the Army, by its construction of the lock and dam, had raised the river's ordinary high-water mark at the City's sewer outlet.

The trial court held that the Army's construction had raised the ordinary high-water mark, believing that the test for such a mark was that point where the action of the water had been so constant as to destroy vegetation. The trial court believed that the mark did not extend to land on which grasses, shrubs and trees grow. The appeals court (which reversed the trial court's findings) believed that the proper place to locate the line was at the point where soil is so usually covered by water that it is wrested from vegetation and its value for agricultural purposes is destroyed. The appellate court went on to say that the proper interpretation of the Howard case was that the vegetation test for a navigable stream's ordinary high-water mark is the place where the soil has been covered by water for sufficient periods of time to destroy its value for agricultural purposes, and not the place below which all vegetation has been destroyed by the water covering the soil. After quoting from the Howard case, and citing the Minnetonka case as being one of "a great number of well considered opinions" which followed the reasoning in Howard, the court went on to state:

> We are satisfied that the sound law as to what constitutes the river bed... is ... the land upon which the waters have visibly asserted their dominion, the value of which for agricultural purposes has been destroyed. The value for agricultural purposes is destroyed where terrestrial plants not all plant life ceases to grow. Just as definitely the same law is that the bed of such stream " does not extend to or include that upon which grasses, shrubs and trees grow though covered by the great annual rises." [citation omitted].

The vegetation test is useful where there is no clear, natural line impressed on the bank. If there is a clear line, as shown by erosion, and other easily recognized characteristics such as shelving, change in the character of the soil, destruction of terrestrial vegetation, and litter, it determines the line of ordinary high-water. (citing cases]. Also a test of the distinct line is the destruction of terrestrial vegetation so these are not really two separate tests but must, of necessity, compliment each other.

The court then went on to apply its understanding of the law to the facts developed at the trial in the lower court. The primary witness for the City was one Shannon, who testified that he found a line where vegetation ceased to grow, and it was that line which he believed to be the ordinary high-water mark. on cross-examination, Shannon was asked whether the land which lay immediately above the line which he had selected could be used for agricultural purposes. He answered that it could not be. The appellate court quoted that question and answer verbatim, and italicized it. The Army's witnesses at the trial testified that they had found a different line, a higher line, which constituted the transition line between the area of essentially terrestrial plant communities and the area affected by repeated inundation. They stated that they did not believe that there would be any agricultural use or value to the land below the line which they had found. The Army's witnesses all made use of shelving, erosion and litter in substantiation of their findings. The trial court disregarded the testimony of the Army's witnesses, and relied upon the testimony of Shannon. It held that the ordinary high-water mark was the lower mark located by Shannon. The appellate court disagreed, stating:

> The district judge...in accepting and depending upon the Shannon evidence ... erred in law. He categorically held that the Allegheny River Bed at Ford City is "land upon which the action of the water has been so constant as to destroy vegetation.' This was also Shannon's foundation.... As we have earlier detailed this is not the law. What the river or action of the water actually destroys is the value of its soil for agricultural purposes. The difference between the two definitions is vital here...and is readily discernible. It is merely a question of using the proper norm.

NATURAL ORDINARY HIGH-WATER: PAST REPORTS

There have been at least two, and perhaps three, NOHW studies done on Big Marine Lake. There has been one NOHW study done on the Carnelian Lakes.

The first Big Marine Lake study was made by Adolph F. Meyer in July of 1958, and is appended to the Orr-Schelen-Mayeron &

Associates report (County Exhibit B). Another was made by DNR personnel in May of 1976 (DNR Exhibit D). The third, which was not introduced into evidence, appears to have been made by D. C. Hult in 1957-1958. It was referred to in DNR Exhibit D and the testimony of Kenneth Reed (Tr. IV-31).

The DNR study concluded that the NOHW for Big Marine Lake was 942.5. Meyer's report gives two NOHWs -- 938.8 and 941.5 - 942.0. Meyer's 938.8 represents the NOHW "for the last 25 years" (1933-1958), while the 941.5 - 942.0 represents a NOHW for "earlier years."

The explanation of how Meyer determined the NOHW is found on pages 2 - 5 of his report. At the time of his survey, the lake was at 937.89. He reports finding a large elm at the mouth at the ravine on the north end of the lake, at ground elevation 942.93. The elm had a long root which was exposed, and partly decayed, at 942.64. He also found an 18 inch elm on the west shore of the north bay, which was growing at ground elevation 942.10. He went on to state:

> Large areas of dead trees around the lake show that Big Marine Lake has passed through long cycles of substantially different levels during the past 50 years or more. There are two groups of dead trees. The largest group consists, primarily, of cottonwoods up to about 18 inches in diameter, and birches up to about nine inches in diameter. These trees appear to have grown up during the drought of the Thirties. They stand on ground only a few inches above the present lake level. Then there is a small group of dead willows, up to about ten inches in diameter, which are now standing in water about one and one-half feet deep. These represent tree growth at still lower stages than those represented by the dead cottonwoods. They must have grown up during a period when the prevailing lake level was about 935 to 936.

Natural ordinary high water on a lake that has no outflow except during periods of 25 or more years must be determined on the basis of the more ordinary hydrological conditions. Periods of excessive of low water and periods of excessive high water must both be eliminated from consideration.

Natural ordinary high water and the runout elevation cannot be equal except on a lake that seldom has any outflow.

> then interpreting the elevation of old trees on lakes that have remained low for many years, with relation to natural ordinary high water, I do not deduct the tree diameter from the ground level to get the ordinary high water mark, because small trees, which start to grow at ordinary high water level, were able to continue their growth at the lower lake stages corresponding to the succeeding dry years, so that at the end of a prolonged period of drought we find large trees growing on ground at substantially the elevation of the old natural ordinary high water mark.

The explanation of how DNR personnel determined the NOHW of Big Marine Lake in 1976 is found in two places. A condensed version is found on pages 3 to 6 of DNR Exhibit D, and an expanded version is found on pages 23 to 34 of Volume V of the transcript. The last two pages of DNR Exhibit D contain pictures of trees which were used by DNR personnel in determining the 942.5 NOHW.

Kenneth Reed, one of the DNR persons who conducted the 1976 study, testified as follows:

> All definitions of NOHW rely upon the character of the vegetation and the character and the condition of the bank of the lake as criterion. In examining a lake for the determination of this level, it is necessary to consider the general characteristics of the lake pertaining to the size, watershed, topography, the character of the soil, whether the lake is landlocked and, of course, all existing records and data. The character of the vegetation determines its significance respecting lake stages. Rushes, cattails and other aquatic grasses grown in water are of no value in NOHW determination. Some mosses, grasses, small shrubs and willows, which will grow out annually, likewise offer no index to stages. Trees, being the largest and most permanent expression of upland vegetation, are used wherever suitable sites can be located. Some trees, for example, tamaracks, spruce, cedar and black ash, offer little to such studies because they are often found on very wet soil, even in standing water. Other trees, for example, pines,

> penden, ash, oak, of the upland, do not live where water covers their roots frequently or continuously and, therefore, offer valuable evidence towards NOHW determinations. Dead trees of the upland species sometimes form a conspicuous fringe around the shores of lakes which, during recent years, have maintained higher levels. Bank erosion and undercutting, along with wash and exposed roots of trees, also supply stage evidence.

Reed then went on to discuss ways in which it is possible to identify those trees which have been affected by water. He

depth of useable growing soil for roots to the diameter of a tree. Unfortunately, this portion of the transcript appears to be garbled, and thus, reference to DNR Exhibit D should be made to understand the formula.

Reed then went on to identify the evidence which he used in determining the NOHW of Big Marine Lake in 1956. While he stated that other evidence was also taken into consideration, the details of his finding all relate to trees. It is very difficult to discover the method which he used to arrive at the actual figure of 942.5. Did he use the formula, and deduct the diameter from the ground level of the trees? Did he look at other vegetation besides trees? What attempts did he make to look at evidence which had been submerged (the lake being at 942.6 when he made his survey)? To what extent did he evaluate the usefulness of the land below 942.5 for agricultural purposes?

Reed testified that 942.5 represented the NOHW for Big Marine Lake. He stated that it was obvious that a lake could have more than one stage or the action of water had remained for a long enough period of time to leave recoverable evidence. He believed, however, that in the absence of any extenuating circumstances (such as drainage, outlet modifications, or catastrophic events) a lake would return, natually, to the NOHW level. He believed that the rise of Big Marine Lake up to, and above, 942.5, was such a natural return to the NOHW level. (Tr. V-23-4).

NATURAL ORDINARY HIGH-WATER MARK: CONCLUSIONS

The proper test for determining the NOHW for the three lakes at issue in this proceeding must come from court cases. The most relevant case in Minnesota is Minnetonka. Minnetonka is based upon the reasoning of Howard, as is Ford City. It is proper, then, to use Ford City as an aid in interpreting Minnetonka.

The DNR personnel who conducted the 1976 survey did not err in the same way that Shannon erred in Ford City, in that they did not set the NOHW line at the point where all vegetation is

destroyed. It would have been very difficult for them to do so, since the lake was at the high level of 942.6 when they did their survey. But in their survey report and in Reed's testimony, there is only scant attention paid to what Ford City calls the "sound law" -- that the NOHW is the mark where the waters have visibly asserted their dominion by destroying the value of land for agricultural purposes; that that land is destroyed for agricultural purposes when terrestrial plants cease to grow; but that does not include land upon which grasses, shrubs and trees grow, even though the land may be covered by water during great annual floods. This is entirely consistent with Minnetonka, which held that the setting of a control elevation which would result in the flooding of lowlands, which lands were still valuable for agricultural purposes even though they were flooded frequently, was, in effect, impermissible because it exceeded the NOHW.

Ford City tells us that a line, set where all vegetation is destroyed, is too low. Minnetonka tells us that a line, set where land suitable for agriculture most of the time would be flooded, is too high. Where, then, is the line properly drawn" It is to be drawn at the point where the presence and action of the water are so common and usual, and so long-continued in all ordinary years, as to destroy the value of the land for_agri cultural purposes by preventing the growth of an ordinary agricultural crop. Destruction of terrestrial plants is a guide.

That is not to say that every time a dry year, or spell of dry years, comes along, and an individual successfully plants and harvests a crop on what had commonly been thought to be unusable lake bed, that the NOHW then moves down to a point below where the crop grew. Such a short-term approach to defining NOHW was twice tried, and twice it failed. See Stenberg v. County of Blue Earth, 112 Minn. 117, 127 N.W. 496 (1910) and State ex rel. Anderson v. District Court, 119 Minn. 132, 137 N.W. 298 (1912). Rather, there is understood to be a limitation of reasonableness, which is based upon a long-term historical study of lake levels. The Minnesota Court hinted at such a standard in Erdman v. Watab Rapids Power Co., 112 Minn.

175, 127 N.W. 487 (1910), when it equated high-water mark with:

> Those points where the water usually rises, such rises as may be reasonably anticipated, but does not mean such extraordinary freshets as cannot be anticipated.

It is impossible to define, with any precision, the appropriate number of years to be used in separating "reasonably anticipated" rises from "extraordinary" rises. It is also impossible to be precise about the percentage of time land can be flooded, but still be above the NOHW. As before, guidance must come from prior cases. For example, it should be remembered that the land held to be above the NOHW in Minnetonka had been flooded for 26 percent of the months during the past 12 years. Although it is not so stated, it can be inferred that such floods came in the spring, or at other wet periods of the year. In addition, it appears those floods were common and ordinary, occurring frequently, if not annually. Such rises must be separated from the far less frequent cyclical rises that occur when waters are at the high point of long-term cycles. The rises of Big Marine Lake believed to have occurred in 1847, 1906, 1920, and 1975-76, are of this latter type. It would seem that they must be classified as 'extraordinary" based on their frequency of occurrence.

We do not have annual lake level data for Big Marine Lake except for recent years. Earlier data is sporatic, and less precise. However, from what data was introduced at the hearing, it appears that the lake level has reached or exceeded 942.5 only three times since 1847 -- in 1847, 1906, and 1975-76.

At the time that the 1976 survey was made, the lake level apparently prevented the surveyors from gathering some of the types

of evidence which such professionals would ordinarily use in making historical studies. These types of evidence were cataloged by Reed in his testimony. Hopefully, with the lake now at a lower level, Reed (and/or other professionals) will be able to find new evidence to assist them in recomputing the NOHWs, as is ordered below. This new evidence, when measured against the test set forth above, will enable proper NOHWs to be computed.

it is also hoped that more precise NOHWs for the Carnelian Lakes can be determined.

Based upon this Interim Report, the Hearing Examiner hereby makes the following:

0 R D E R

The hearing in this matter shall be reconvened at 7:00 p.m. on Thursday, October 6, 1977, at Hooley Hall, Washington County Fairgrounds, for the purpose of accepting testimony and evidence regarding natural ordinary high water marks of Big Marine Lake, Big Carnelian Lake, and Little Carnelian Lake. DNR is directed to recompute the NOHWs consistent with the foregoing Interim Report, and present them at that time.

Dated: September 9, 1977.

ALLAN W. KLEIN
Hearing Examiner